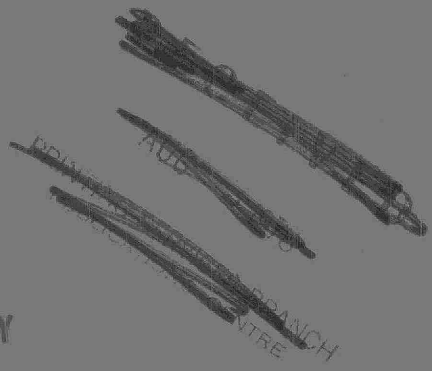
WATER POLLUTION SURVEY OF THE POLICE VILLAGE OF ST. ANNE DE PRESCOTT TOWNSHIP OF EAST HAWKESBURY COUNTY OF PRESCOTT

1977



Ministry of the Environment

Ontario

WATER POLLUTION SURVEY

OF THE

POLICE VILLAGE OF ST. ANNE DE PRESCOTT

TOWNSHIP OF EAST HAWKESBURY

- 1977 -

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I N D E X

A P P E N D I C E S

INTRODUCTION

Staff from the Municipal and Private Abatement Section of the Southeastern Ontario Regional offices of the Ministry of Environment completed a Municipal Water Pollution Survey of the Police Village of St. Anne de Prescott during the months of June and August of 1977. This study was primarily undertaken to collect data to ascertain the status of water quality from land drainage systems within the confines of the Police Village. The following persons were interviewed during the course of the survey:

1) R. Brunette, Clerk-treasurer,
   Township of East Hawkesbury.

2) Mr. R. Leblanc, Snr. Health Inspector,
   Eastern Ontario Health Unit,
   L'Orignal, Ontario.

GENERAL

The Police Village of St. Anne de Prescott is located in the Southeastern section of the Township of East Hawkesbury. The village lies approximately 2 miles west of the Ontario-Quebec provincial boundary at the junction on County Road # 18 and County Road # 14. The village is also about 6 miles south of the village of St. Eugene. Like other communities nearby, the village is developed primarily along an east-west axis, paralleling a section of County Road # 18.

The population of the community is about 137 (1976 Assessment figures), and has changed little in the past 10 years. There is no industry in the rural community, aside from a few commercial establishments, and retail outlets. St. Anne de Prescott is largely residential, and it is presumed that many commute to work in larger centres, or are pensioners.

TOPOGRAPHICAL AND GEOLOGICAL CONDITIONS

The Community of St. Anne de Prescott is situated on the edge of a gravel knoll on a relatively flat plain, which is underlain largely by a clay soil commonly known as Bearbrook clay. This knoll consists of a deposit of till-like gravel, and runs through the west end of the village in a south-west to northeasterly direction. The underlying rock formation is lime-stone, commonly referred to as the Ottawa Formation. This rock formation

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has a significant influence on physiography and drainage in the village Well records for the area indicate that this formation is encountered between the elevation of 70 to 180 feet. The overburden consists of a clay and gravel soil.

SEWAGE DISPOSAL

Generally, sewage wastes are directed to individual septic tank systems, and a few outdoor privies are used. It was found, however, through a recent survey conducted by the Eastern Ontario Health Unit, that a large portion of these systems are inoperative, and the wastes are directed mainly to the storm sewer network and open ditches. Several instances of domestic discharges to the local drainage system were observed at the time of this investigation, and it was suspected that it was common practice to dispose of basin and laundry wastes in the same manner.

The report by the Eastern Ontario Health Unit indicated that about 75% of these existing disposal systems are connected directly to the storm sewer network.

WATER SUPPLY

Water for domestic use is obtained from individual well supplies. In a recent report prepared by the Eastern Ontario Health Unit, it was established that 40% of the well samples collected showed some degree of contamination.

LAND DRAINAGE

The existing drainage network consists largely of open ditches, although some parts of the main street are serviced by storm sewers. These sewers have outlets into ditches along the county road to the east, which eventually discharges into the East branch of the Rigaud River.

During our investigations at this eastern outlet, evidence of sewage wastes were observed, and a strong septic odour was detected. In addition, several sewage discharges to an open ditch at the southeast quarter of the village were apparent.

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The surface water samples collected during this survey revealed that runoff within the village carries a great deal of contaminating substances. These results are illustrated in tables 1 and 2, noted in the appendix of this report.

SANITARY SURVEY

In February and March of 1977, a door-to-door survey was conducted in St. Anne de Prescott by the Eastern Ontario Health Unit, at the request of the Township of East Hawkesbury. The purpose of this survey was to evaluate the extent of contamination in individual water supplies and to determine the adequacy of existing sewage disposal systems.

A total of 38 homes were visited and the occupants interviewed. Information was gathered regarding the type of wells and their depth, and the sewage system serving the dwelling. A summary of the survey results was reported to Mr. R. Brunette, Clerk of the Township of East Hawkesbury, in a letter dated May 30, 1977, from the Eastern Ontario Health Unit.

The results of this survey indicated that about 40% of the water well samples showed some degree of contamination. The survey also revealed that approximately 75% of the residences were connected to the municipal storm sewer system, and concluded that to rectify this situation could not be easily accomplished because of the following factors:

1) Existing private well supplies are poorly located on the residential lots.

2) Many lots are less than the required minimum of 15,000 square feet.

3) The soil conditions for half of the village is Bearbrook clay, and the remainder consists of a sandy gravel loam.

WATER POLLUTION SURVEY

Results and Interpretation

Water samples were collected at the various locations throughout the village, and analysed for bacteriological and chemical contaminants.

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The sampling points are indicated on the map accompanying this report, and further outlined in detail below. The results are tabulated in the appendix.

A total of 20 samples were collected from seven locations. Samples were bacteriologically examined at the Ministry of Environment laboratory, using the Membrane Filter method. (appendix II).

The chemical samples were also analysed at the Ministry laboratory. The results of the analysis, and discussions of the meaning of the results, are appended to this report as follows:

Appendix I	- Significance of Bacteriological Examinations
Appendix II	- Membrane Filter Technique
Appendix III	- Bacteriological Sample Results
Appendix IV	- Significance of Chemical Analysis
Appendix V	- Chemical Sample Results

A description of the major sampling stations and amounts in the results of samples collected at these stations are as follows:

1 - Township Road South (Sample 301)

- At this location, samples were collected from the sewer outfall on the west side. The bacteriological counts were extremely high on both occasions. The chemical results showed a BOD of 650 and a suspended solid content of 3400. This certainly reflects the occurrence of a great deal of contamination here. It was also observed, on the day of inspection, that a strong septic odour prevailed at the outlet.

2 - Main Street East - South Side - Sewer Outfall (Sample 302)

- At this location, samples were collected only from the outfall located on the south side. The bacteriological counts were high, and the chemical results showed some contamination on both sampling occasions.

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3 - Main Street East - Three Off-Take Ditches - South Side (Samples 303 to 305)

- At these three separate locations, along the southeast quarter of the village, samples were collected from off-take ditches flowing south to a main ditch behind three residences. All bacteriological and chemical results showed a high degree of contamination from sewage wastes. These results clearly indicated the fact that wastes are discharging into the village drainage network.

4 - Main Street West - Ditch Inlet - South Side (Sample 306)

- At this location, samples were collected from the ditch inlet. The bacteriological results were very high in both instances of sampling, and the chemical results showed a high degree of contamination with a BOD of 190 and a suspended solids content of 60.

5 - Off-Take Ditch - South Central - Village (Sample 307)

- At this location, along the southern perimeter of the village, samples were collected from the open ditch. The bacteriological results were high, and the chemical analysis showed some contamination.

Summary of Results

All of the samples collected from the storm sewer outfall and ditches indicated very high coliform counts. The chemical analyses also reflected the same degree of contamination problems, with BOD counts ranging from a high of 1950 to a low of 9, and with the suspended solids at a maximum of 12,000 and a minimum of 60. These high concentrations occurred mainly in the off-take ditches behind several residences, clearly indicating that wastes are being discharged into the village drainage network.

The bacteriological results from all locations also showed that runoff from the existing community drainage network and storm sewer outfalls is definitely degrading the water quality in the area.

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The results substantiate claims by the Eastern Ontario Health Unit - that domestic waste is gaining access to the storm sewer and storm ditch systems. Elimination of these discharges to the sewer network and a proper waste disposal system, should resolve the contamination problem, resulting in serious water pollution in this area.

CONCLUSION AND RECOMMENDATION

The survey investigation clearly shows that sewage wastes are being discharged to the storm sewer and land drainage networks in this village. This discharge eventually finds its way to the East Branch of the Rigaud River and adjacent farmland, causing a significant deletorious effect on water quality.

These results are further rei forced by the survey conducted by the Eastern Ontario Health Unit, which indicated that 75% of the village dwellings are connected to the drainage network, and that at least 40% of the water supplies have some degree of pollution.

Therefore, it is recommended that the municipality initiate action to develop a sewage works project to eliminate the contamination of the local watercourse.

APPENDIX I

SIGNIFICANCE OF BACTERIOLOGICAL EXAMINATIONS

Total coliform organisms include a wide variety of bacteria ranging from the genus (group) Escherichia Coli (E. Coli), which originate mainly in the intestines of man and other warm-blooded animals, to the genera Citrobacter and Enterobacter aerogenes. The latter genera are basically found in soil, but are also present in feces in small numbers. The presence of total coliforms in water may indicate soil runoff or, more importantly, less recent fecal pollution, since organisms of the Enterobacter-Citrobacter groups tend to survive longer in water than do members of the Escherichia Coli group, and even to multiply when suitable environmental conditions exist.

The Fecal Coliform organisms are those coliform bacteria that are of intestinal origin, and therefore, are an indicator of recent fecal pollution. Most of the coliform bacteria found by the fecal coliform test are of the genus, Escherichia Coli.

Fecal Streptococci organisms are normal inhabitants of the large intestine of man and animals, and generally, do not multiply outside the human body. In waters polluted with fecal material, fecal streptococci are usually found along with fecal coliform bacteria, but in smaller numbers. When the number of fecal streptococci bacteria approximates or is greater than the number of fecal coliform organisms, animals are the probable source.

The Ministry of Environment Guidelines for Water Quality Management in Ontario (1974), indicate that water used for total body contact recreation can be considered impaired when the total coliform, fecal coliform and/or fecal streptococcus geometric mean density exceeds 1000, 100, and/or 20 per 100 ml.

APPENDIX II

MEMBRANE FILTER TECHNIQUE

A filtration technique for enumerating coliform bacteria in water was developed during the early 1940's. It has been accepted as a standard for the sanitary quality of water. A portion of the sample is passed through a cellulose acetate filter membrane of such porosity as to retain bacteria while permitting the water to pass through freely. The filter membrane is then placed aseptically in a Petri dish on an absorbent pad saturated with a differential nutrient solution, such as M-Endo broth (buffered lactose-peptone-salts with bile salts and decolorized basic fuchsin) and incubated at 35°C. for 20 hours. The membrane is then examined by low-power microscopy, and purplish green colonies with a metallic sheen are counted. These are considered to be coliform bacteria.

The amount of sample to be filtered varies according to the nature of the specimen: 100 to 500 ml. of finished, municipal water may be examined, whereas 0.1 to 10 ml. of well water may yield 20 to 80 coliform colonies (the recommended density for most accurate counting). Greater precision is possible by the membrane filter technique than by the multiple lactose tube method of estimating coliforms, because larger volumes of samples can be examined, and results are secured more quickly. The method is limited, however, by the clogging of the filters with algae, colloidal and other materials, and by the inhibition of coliforms in specimens containing excessively high, noncoliform populations.

APPENDIX III

BACTERIOLOGICAL ANALYSIS

VILLAGE OF ST. ANNE DE PRESCOTT

WATER POLLUTION SURVEY

1977

TABLE 1.

DATE	SAMPLE NO.	LOCATION	TOTAL COLIFORMS (MF)	FECAL COLIFORMS (MF)	FECAL STREPTOCOCCUS (MF)
June 14/77	301	Twp. Rd. South Sewer Outfall	1,940,000	30,000	26,000
Aug. 15/77	301	"	11,000,000	150,000	G 150,000
June 14/77	302	Main St. East South Side	670,000	83,000	3,900
Aug. 15/77	302	"	G 1,500,000	37,000	2,000
June 14/77	303	Off-take Ditch Main St. East South Side	77,000,000	2,100,000	130,000
Aug. 15/77	303	"	280,000	9,000	5,000
June 14/77	304	Off-take Ditch Main St. East South Side	318,000,000	G 1,500,000	22,000
Aug. 15/77	304	NO FLOW	-	-	-
June 14/77	305	Off-take Ditch Main St. East South Side	201,000,000	850,000	3,000
Aug. 15/77	305	NO FLOW	-	-	-
June 14/77	306	Main St. West Ditch Inlet South Side	71,000,000	150,000	L 100
Aug. 15/77	306	"	G 15,000,000	G 180,000	610
June 14/77	307	Open Ditch Village Central South Side	93,000	1,000	15,000
Aug. 15/77	307	"	210,000	10,000	70,000

G = Greater than
L = Less than

APPENDIX IV

SIGNIFICANCE OF CHEMICAL ANALYSES

Biochemical Oxygen Demand (BOD)

The biochemical oxygen demand (BOD) of domestic and industrial waste waters is the amount of molecular oxygen required to stabilize the decomposable matter present in a water by an aerobic biochemical action. Since it is impractical in actual work to utilize tests that require more than a few days for reliable results, it is customary to make BOD tests at a standard temperature of 20°C for a 5-day period, which is about 68% of the ultimate, when a reaction velocity co-efficient of 0.10 is used. A high BOD is indicative of organic or chemical pollution.

In most cases, adequate protection for surface waters should be provided if BOD concentrations in waste discharges exceed 15 mg/l, but in some cases, a much higher concentration can be tolerated, while in other cases, a concentration less than 15 mg/l could be detrimental. Special situations have to be examined individually. This will ensure that the biochemical oxygen demand from the various sources, does not lower the oxygen concentration in the watercourse below 6-7 mg/litre and thus make the watercourse acceptable for various fresh water biota.

Suspended Solids

The suspended solids value is the most significant of the solids determination, and indicates the measure of the undissolved solids of an organic or inorganic nature. Organic solids create sludge banks and decompose, causing odours and unsightly conditions. Inorganic suspended solids blanket the stream bed affecting benthos organisms.

The effects of suspended solids in water are reflected in difficulties associated with water purification, decompositions in streams, and injury to the habitat of fish. In most cases, adequate protection for surface waters should be provided if suspended solids concentrations in waste discharges exceed 15 ppm.

Nitrogen

Total Kjeldahl is a measure of the total nitrogenuous matter present except that measured as nitrite and nitrate nitrogens. The total kjeldahl less the ammonia

nitrogen measure the organic nitrogen present. Ammonia and organic nitrogen determinations are important in determining the availability of nitrogen for biological utilization. The normal range for Total Kjeldahl would be 0.1 to 015 mg/l.

Phosphorous

This element is commonly found in nature in the form of phosphates (PO_4). Raw or treated sewage, some industrial wastes, and agricultural drainage contain significant concentrations of phosphate. The laboratory provides two phosphorous determinations: Total phosphorous and soluble phosphorous; Total phosphorous includes orthophosphate, polyphosphate and organic phosphorous, while soluble phosphorous represents orthophosphates only.

Phosphorous is an essential nutrient for plant life, and like nitrogen, passes through cycles of decomposition and photosynthesis. Nitrogen and phosphorous are both essential for the growth of algae, and limitation of these compounds controls their growth rate. Generally, soluble phosphorous in concentrations of 0.01 mg/l or greater, at the beginning of the growing season, may cause algae nuisance conditions.

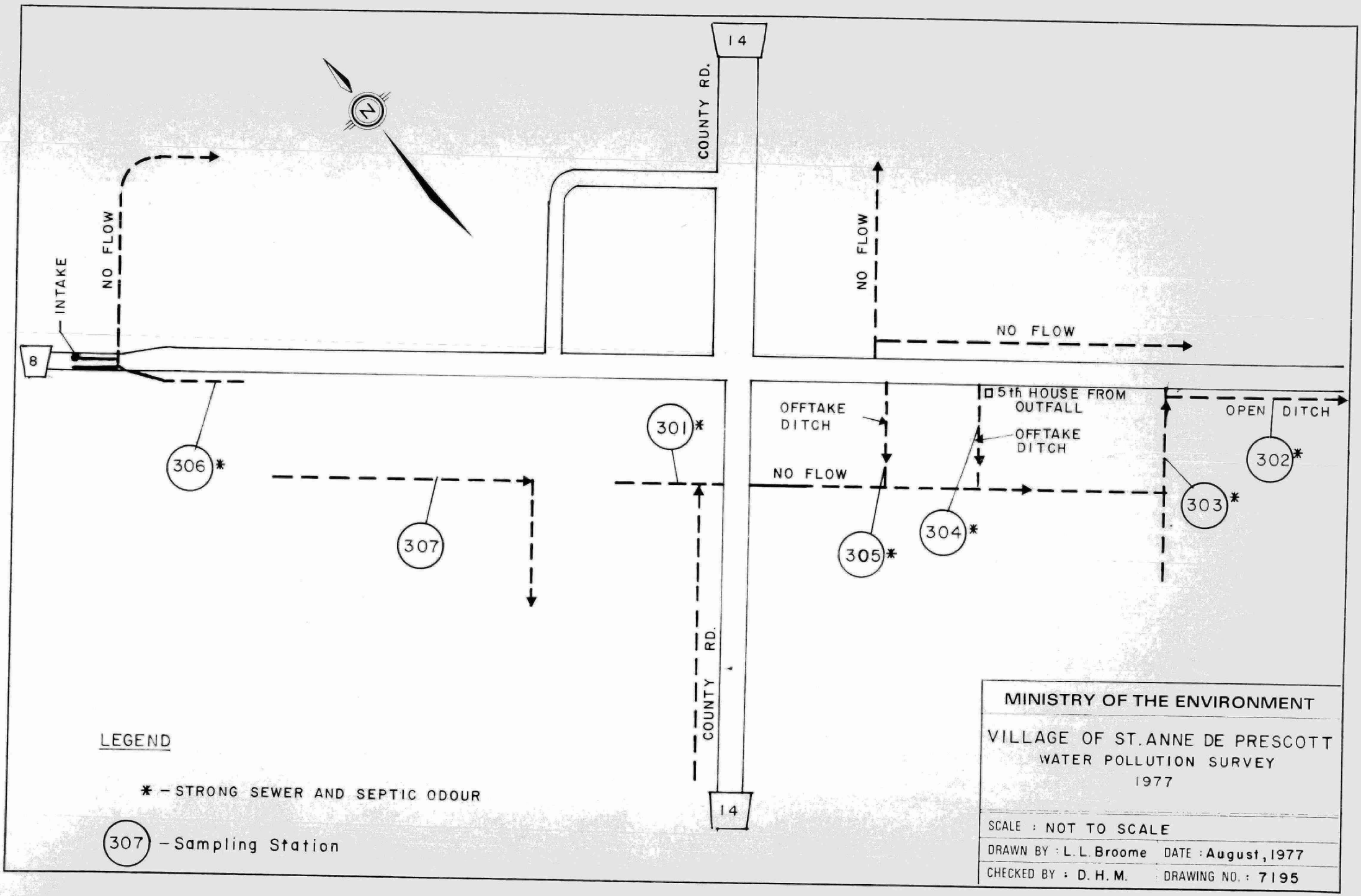
APPENDIX V — CHEMICAL ANALYSIS — TABLE 2

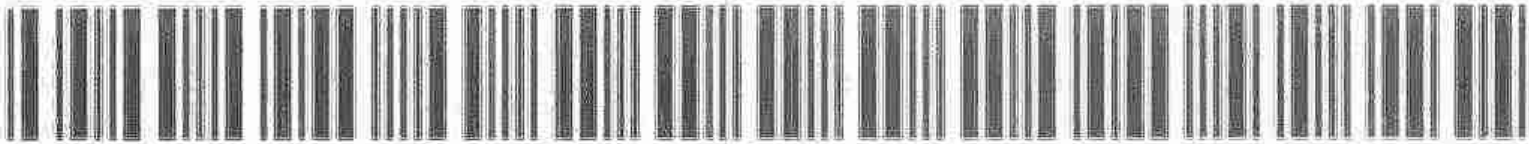
VILLAGE OF ST. ANNE DE PRESCOTT - WATER POLLUTION SURVEY

1977

DATE	SAMPLE NO.	LOCATION	5-DAY BOD	SUSPENDED SOLIDS	TOTAL KJELDAHL	TOTAL PHOSPHORUS	CONDUC-TIVITY UMHOS/CM	PH
June 14	301	Twp. Rd. South, Sewer Outfall	650	3400	130	40	2350	7.2
Aug. 15	301	"	90	660	90	16		7.1
June 14	302	Main Street East, Sewer Outfall South Side	14	60	6.5	1.8	1160	7.5
Aug 15	302	"	28	35	1.0	1.56		7.4
June 14	303	Off-take Ditch, Main St. East South Side	1950	12000	200	100	2000	7.0
Aug. 15	303	"	L 20	L 15	.60	.96		7.8
June 14	304	Off-take Ditch, Main St. East South Side	800	3000	105	27	2300	7.2
Aug. 15	304	NO FLOW						
June 14	305	Off-take Ditch, Main St. East South Side	90	225	102	32	1500	7.3
Aug. 15	305	NO FLOW						
June 14	306	Main St. W, Ditch Inlet S. Side	190	60	75	6.0	1480	6.8
Aug. 15	306	"	G 300	1960	120	28		7.7
June 14	307	Open ditch, Central S. Village	9	225	3	2.2	1330	8.1
Aug. 15	307	"	L 20	140	3.5	2.12		7.5

G = Greater than
L = Less than


14
COUNTY RD.
N
INTAKE
NO FLOW
NO FLOW
NO FLOW
8
5th HOUSE FROM OUTFALL
OFFTAKE DITCH
OFFTAKE DITCH
OPEN DITCH
NO FLOW
306*
307
301*
305*
304*
303*
302*
COUNTY RD.
14
LEGEND
* – STRONG SEWER AND SEPTIC ODOUR
307 – Sampling Station
MINISTRY OF THE ENVIRONMENT
VILLAGE OF ST. ANNE DE PRESCOTT
WATER POLLUTION SURVEY
1977
SCALE : NOT TO SCALE
DRAWN BY : L. L. Broome DATE : August, 1977
CHECKED BY : D. H. M. DRAWING NO. : 7195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